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PCT/GB 2005 / 0 0 0 9 6 6



INVESTOR IN PEOPLE

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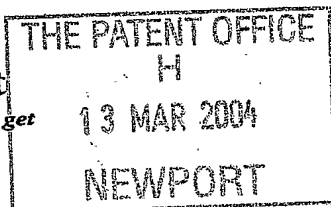
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2258/ii

15MAR04 E880840-2 D01147  
P01/7700 0.00-0405717.0 WNF

2. Patent application number

(The Patent Office will fill in this part)

0405717.0

13 MAR 2004

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Britax Excelsior Limited  
1 Churchill Way West  
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Patents ADP number (if you know it)

GB

If the applicant is a corporate body, give the country/state of its incorporation

GB

6304307001

4. Title of the invention

Safety Seat

5. Name of your agent (if you have one)

NIGEL BROOKS CPA

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

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GU32 1QN

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463001

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Country

Priority application number  
(if you know it)

Date of filing  
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GB

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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
  - c) any named applicant is a corporate body.
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1. I/We request the grant of a patent on the basis of this application.

Signature	<i>[Signature]</i>	Date
		12/03/04

2. Name and daytime telephone number of person to contact in the United Kingdom

NIGEL BROOKS CPA (01730) 823647

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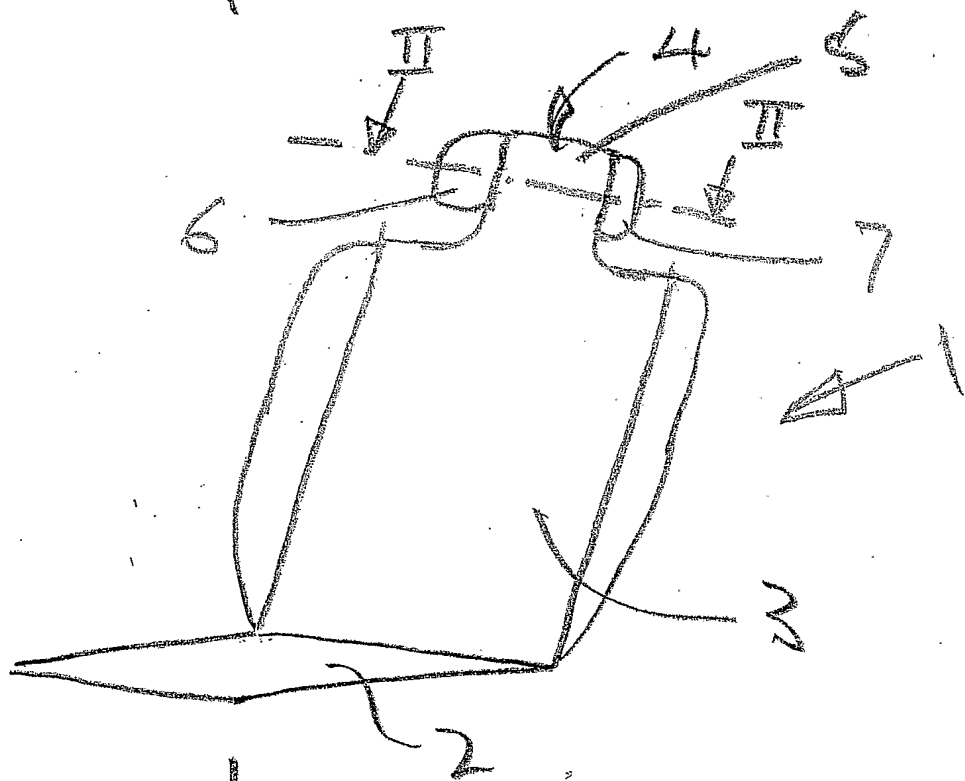


FIGURE 1

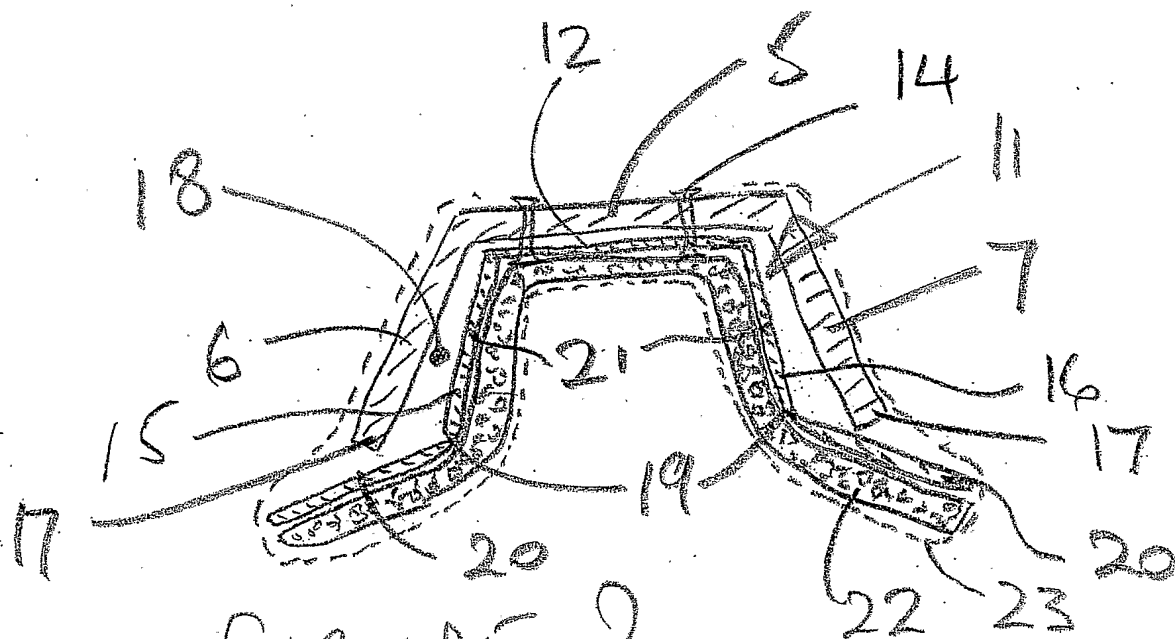


FIGURE 2

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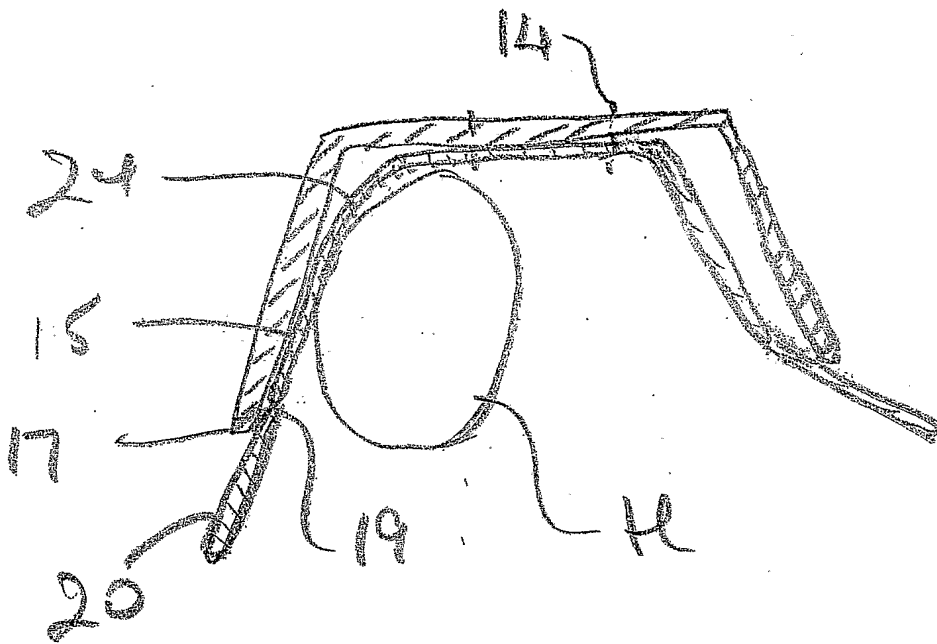


FIGURE 3

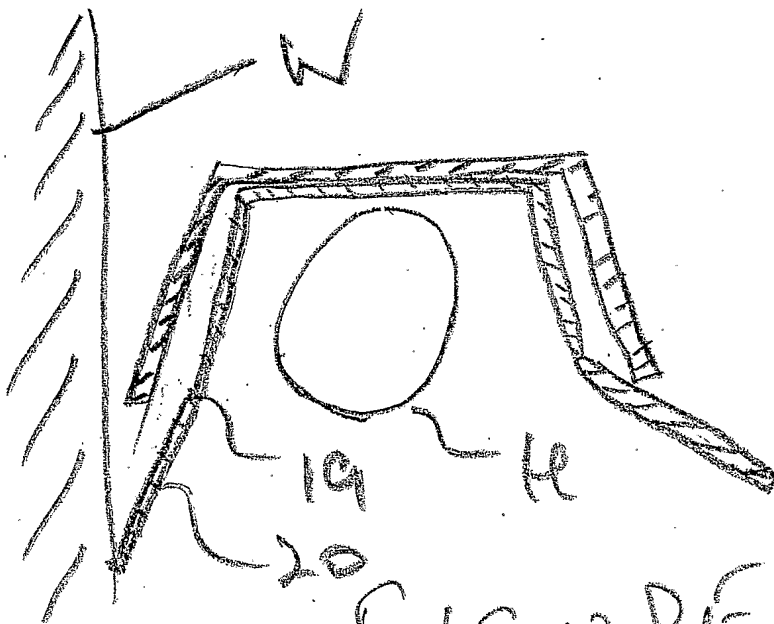


FIGURE 4

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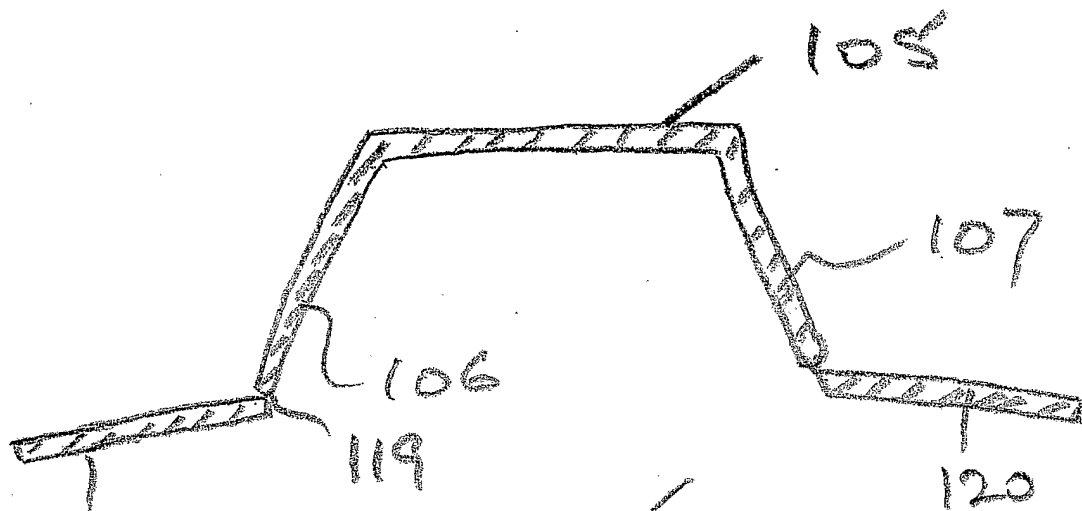


FIGURE 5

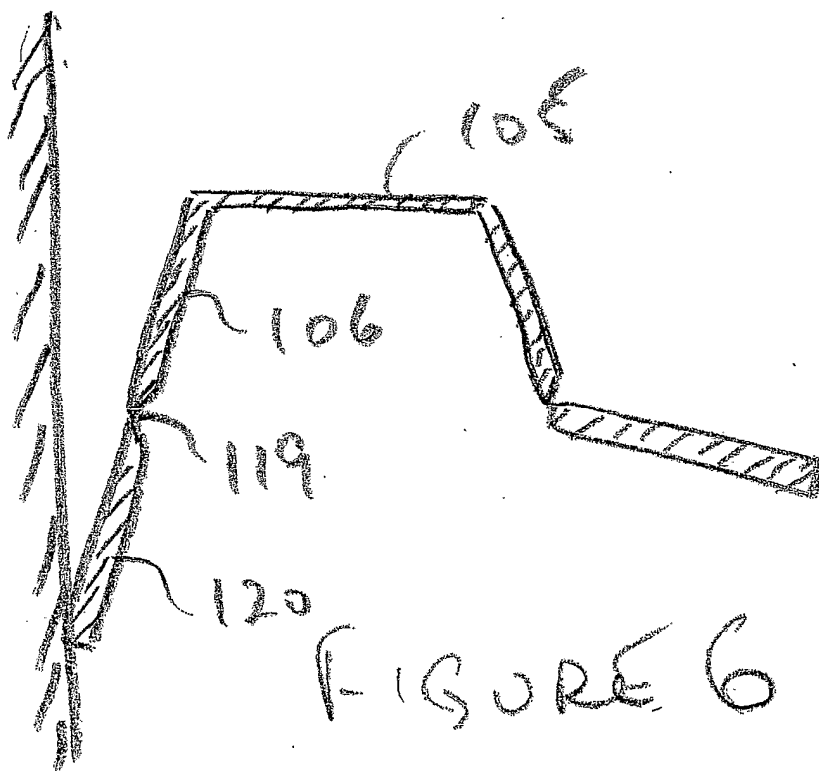


FIGURE 6

## Safety Seat

The present invention relates to a safety seat, particularly though not exclusively a child safety seat for an automobile.

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Safety seats are designed:

- to restrain the occupant from being thrown more than a certain distance from the seat in the event of an accident and
- to limit the deceleration (both its maximum value and its period above a threshold) experienced by an occupant.

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A direction in which less distance is available before impact of an occupant with an automobile part than some others is sideways towards a window, door or door pillar. To restrain sideways movement of an occupant's head, seats can be provided with a head protecting structure in the form of a vertical extension of a back of the seat, the extension having forwards extending wings for limiting lateral movement of the head. In this specification, this structure is referred to as a "winged headrest". To avoid the wings causing the self-same problem that the seat is intended to avoid, namely injury from impact with a hard surface, the winged headrest is normally provided with a padded lining.

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The object of the present invention is to provide a safety seat with improved head protection.

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According to the invention there is provided a safety seat comprising:

- a winged headrest, the head rest having:
  - a rear head support and
  - forwards-and-sideways extending support wings, fixed to the rear head support at respective opposite sides thereof
- deformable extensions of the support wings, each extension being hingedly connected to its support wing remote from the rear head support and normally extending obliquely forwards and laterally outwards of its support wing,

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An advantage of this invention is that a safety seat fitted with the forwards extensions provides enhanced protection without the feeling of encumbrance that would result from having them fixed in the position to which they are adapted to pivot.

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Whilst it can be envisaged that the deformable lining wings could be individually connected to the rear head support, as by tongues on the lining wings engaging in slots in the rear head support; in the preferred embodiment, the two lining wings are interconnected by a crosspiece abutting the rear head support.

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The lining wings can be provided with energy absorbent pads on their sides away from their support wings, i.e. on their inner sides.

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Normally the lining wings and their pads where provided, together with their crosspiece where provided, will be covered with upholstery fabric.

To help understanding of the invention, a specific embodiment thereof will now be described by way of example and with reference to the accompanying drawings, in which:

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Figure 1 is a perspective view of a shell of a child safety seat to be equipped with a first embodiment of a head rest in accordance with the invention;

Figure 2 is a cross-sectional view on the line II-II in Figure 1 including the lining and upholstery of the head rest of Figure 1;

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Figure 3 is a simplified view similar to Figure 2 of an occupant's head impacting the left-hand wing of the seat of Figure 1;

Figure 4 is a similar view of another impact mode;

Figure 5 is a simplified view similar to Figure 3 of a second embodiment of a head rest in accordance with the invention; and

Figure 6 is a similar view of the second head rest on impact.

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Referring first to Figure 1 of the drawings, a child safety seat has a chassis or shell 1 comprising a squab 2 and a back 3. The shell can be a unitary moulding or a two part moulding of the squab and the back. Above the back, the shell has a head part 4 having a rear head support 5 and a pair of right and left forwards-and-sideways

extending support wings 6,7. The shell is a polypropylene moulding with the head rest being moulded integrally with the rest of the moulding.

In accordance with the invention and as shown in Figure 2, a deformable lining 11, also a polypropylene moulding, is provided in the head rest. It has a crosspiece 12, clipped 14 to the head support 5 and right and left deformable wings 15,16. These are longer than the support wings 5,6 of the head part 4, extending past distal edges 17 of the support wings. It should be noted also that the deformable wings are spaced inwards from the support wings, with voids 18 defined between them. The deformable wings are divided into two in their forwards extent by a living hinge 19 into a front portion 20 and a rear portion 21. The living hinge is positioned just inside the distal edges of the shell wings.

The injection moulded lining has its own foam material lining 22, the whole being covered with upholstery 23.

The result of the arrangement is that if as shown in Figure 3, an occupant's head H impacts the lining in side impact of the vehicle equipped with the seat, the relevant lining wing will be pressed against the shell wing. This involves energy absorbing (maximum acceleration limiting) deformation of not only the foam material, but also of the lining wing and to a less extent of the shell wing. These deformations lead to the result that the acceleration of the head is limited from what it would have been in the absence of the lining wings. The lining wing deformation 24 is shown in Figure 3 and with it compressing against the shell wing, the front portion 20 of the lining wing pivots forwards about the shell edge 17, from a position swept back with respect to the shell wing to a position generally in line with the compressed inner portion of the lining. This provides for protection of the head in impact with a side window for instance even outside the distal edges, by approximately the length of the front portion beyond the living hinge. Whilst such impact may be thought unlikely if the head has impacted inside the head rest, we are aware from tests that there is a high likelihood of the head moving out of the head rest during a side impact.

Typically, the lining moulding will be 3mm thick and the foam material 12mm thick, with a 28gm/ltr density in EPS. Both lining will be reduced to half its thickness

at the hinge. The foam also can be reduced in thickness at the hinge, to facilitate the pivoting.

Turning now to Figure 4, it shows an impact mode, wherein the squab of the  
5 seat moves less than the top of the seat, as would be the case where the squab impact  
a wheel arch and causes the top of the seat to pivot against the side window of a car. In  
such impact, and under inertia of the occupant reacting against shoulder wings of the  
seat shell, the remote end of the front portion 20 can strike the window W before the  
head strikes the lining. This action causes the front portion to pivot about its living  
10 hinge 19.

Turning on to Figure 5 & 6, the head rest there shown can have an EPS and  
upholstery lining, neither of which are shown. The headrest as such has a rear head  
support 105 and a pair of right and left forwards-and-sideways extending support  
15 wings 106, 107. Integrally moulded with the wings are extensions 120, connected to  
thereto at living hinges 119. The extensions extend forwards and laterally outwards.

On impact as in Figure 4, the extensions pivot in to provide an enhanced  
region of protection from impact of the head with the vehicle side.